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## Chapter 15. Biological Resources

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### 15.1 Overview

This chapter provides information about biological resources at ARC, including the types and distribution of habitat, wildlife, vegetation, and special-status species. Applicable regulations are discussed, as are relevant plans, programs, policies, and measures that are designed to preserve and protect special-status wildlife and their habitats at ARC. The information presented in this chapter was drawn from the November 2009 NASA ARC ERD (NASA 2009), NADP EIS (Design, Community & Environment 2002), and the results of biological studies that have been previously conducted at ARC.

### 15.2 Regulatory Background

#### 15.2.1 Federal Regulations

##### 15.2.1.1 *Endangered Species Act*

The federal ESA protects fish and wildlife species that are listed as threatened or endangered, and their habitats. “Endangered” species, subspecies, or distinct population segments are those that are in danger of extinction through all or a significant portion of their range, and “threatened” species, subspecies, or distinct population segments are likely to become endangered in the near future. The USFWS administers ESA.

##### 15.2.1.1.1 Section 7

Section 7 of ESA requires federal agencies to ensure that their actions do not jeopardize the continued existence of a listed fish, wildlife, or plant species, or destroy or adversely modify that species’ critical habitat, as defined and designated by federal regulations. Federally listed species that are known to occur at the facility include California brown pelican (*Pelecanus occidentalis*), California clapper rail (*Rallus longirostris obsoletus*), California least tern (*Sterna antillarum browni*), western snowy plover (*Charadrius alexandrinus mivosus*), and salt marsh harvest mouse (*Reithrodontomys raviventris*).

##### 15.2.1.1.2 Section 9

Section 9 of ESA prohibits the take of any fish or wildlife species listed as endangered under the act, and also prohibits removing, digging up, cutting, maliciously damaging, or destroying federally listed plants on sites under federal jurisdiction. As defined by ESA, “take” means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” “Harm” is defined as “any act that kills or injures the species, including significant habitat modification.” Take of threatened species is also prohibited unless otherwise authorized by federal regulations

##### 15.2.1.2 *Migratory Bird Treaty Act*

The federal Migratory Bird Treaty Act (MBTA), administered by the USFWS, implements a series of treaties between the United States, Mexico, and Canada that provide for the



international protection of migratory birds. The law contains no requirement to prove intent to violate any of its provisions. Wording in the act makes it clear that most actions that result in “taking” or possession (permanent or temporary) of a protected species can be a violation of the act. In the MBTA, the word “take” is defined as meaning “pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.” The provisions of the MBTA are nearly absolute, “except as permitted by regulations.” Examples of permitted actions that do not violate the law are the possession of a hunting license to pursue specific game birds, legitimate research activities, display in zoological gardens, bird-banding, and similar activities.

### 15.2.1.3 *Bald and Golden Eagle Protection Act*

Protection of the bald eagle (*Haliaeetus leucocephalus*) began in 1940 with the passage of the Eagle Protection Act. The Eagle Protection Act was later amended to include the golden eagle (*Aquila chrysaetos*) and was renamed. The Bald and Golden Eagle Protection Act makes it unlawful to import, export, take, sell, purchase, or barter any bald eagle or golden eagle, their parts, products, nests, or eggs. Take includes pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing. The USFWS may grant exceptions for scientific or exhibition use, or for traditional and cultural use by Native Americans. However, no permits may be issued for import, export, or commercial activities involving eagles.

### 15.2.1.4 *National Environmental Policy Act*

NEPA requires federal agencies to include in their decision-making process appropriate and careful consideration of all environmental effects of a proposed action and of possible alternative actions. Measures to avoid or minimize the adverse effects of proposed actions and to restore and enhance environmental quality as much as possible must be developed and discussed where feasible.

## 15.2.2 **State Laws**

The most relevant state laws regulating biological resources are the California Endangered Species Act and the California Fish and Game Code, each of which is described below.

### 15.2.2.1 *California Endangered Species Act*

The California Endangered Species Act (CESA) protects wildlife and plants listed as threatened and endangered by the California Fish and Game Commission. CDFW administers the act. The act requires state agencies to conserve threatened and endangered species (Section 2055), and thus restricts all persons from taking listed species except under certain circumstances. The act defines “take” as any action or attempt to “hunt, pursue, catch, capture, or kill.” The CDFW may authorize take under Section 2081 agreements, except for designated “fully protected species.” The requirements for an application for an incidental take permit under the CESA are described in Section 2081 of the California Fish and Game Code and in final adopted regulations for implementing Sections 2080 and 2081.



### 15.2.2.2 California Fish and Game Code

The California Fish and Game Code provides protection from take for a variety of species. Section 5050 lists protected amphibians and reptiles, eggs and nests of all birds are protected under Section 3503, nesting birds (including raptors and passerines) under Sections 3503.5 and 3513, birds of prey under Section 3503.5, and fully protected birds under Section 3511. All birds that occur naturally in California and are not resident game birds, migratory game birds, or fully protected birds are considered non-game birds and are protected under Section 3800. Mammals are protected under Section 4700. Hawks, falcons, and owls that occur at ARC are thus protected under Section 3503.5 and non-game birds under Section 3800. In addition, several bird species listed under Section 3511, including golden eagles and white-tailed kites, occur or have the potential to occur in ARC. Specific measures to avoid take of western burrowing owl (*Athene cunicularia hypogea*), a protected bird of prey, are incorporated into the Western Burrowing Owl Habitat Management Plan (BOHMP) written into the 2002 NADP EIS.

### 15.2.2.3 California Native Plant Protection Act

The California Native Plant Protection Act of 1977 (CNPPA) prohibits importation of rare and endangered plants into California, take of rare and endangered plants, and sale of rare and endangered plants. CESA defers to the CNPPA, which ensures that state-listed plant species are protected when state agencies are involved in projects subject to the CEQA. In this case, plants listed as rare under the CNPPA are not protected under CESA but rather under CEQA.

The following kinds of activities are exempt from the California Native Plant Protection Act:

- Agricultural operations
- Fire control measures
- Timber harvest operations
- Mining assessment work
- Removal of plants by private landowners on private land for construction of canals, ditches, buildings, roads, or other rights-of-way
- Removal of plants for performance of a public service by a public agency or a publicly or privately-owned public utility

While CEQA does not apply directly to federal agencies, ARC does consider the impacts on state-listed species during NEPA analyses. CEQA does apply to state agencies located at ARC.

## 15.2.3 Local Regulations

### 15.2.3.1 Santa Clara County Heritage Tree Ordinance

The Santa Clara County Heritage Tree Ordinance is designed to protect trees in order to provide aesthetic beauty, economic vitality, and environmental stability for county lands. Protected trees generally include:



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- Trees that are 95.8 centimeters (37.7 inches) or more in circumference (30 centimeters [12 inches] in diameter) at 137 centimeters (4.5 feet) above ground
  - Multiple trunk trees with a total of 192 centimeters (75.4 inches) in circumference (61 centimeters [24 inches] in diameter of all trunks within the following areas of the county:
    - Parcels zoned “hillside” that are 3 acres or less
    - Parcels within a “-d” (Design Review) combining zoning district
    - Parcels within the Los Gatos Specific Plan Area

Any heritage tree, as defined by the Tree Preservation Ordinance

- Any tree required to be planted as a replacement for an unlawfully removed tree
- Any tree required to be planted or retained by the conditions of approval for any use permit, building site approval, grading permit, architectural and site approval, design review, special permit, or subdivision
- Any tree that meets the minimum measurements and occurs on any property owned or leased by the County of Santa Clara
- Any tree, regardless of size, within road rights-of-way and easements of the county, whether within or outside of the unincorporated territory of the county

The ordinance requires that project proponents take into account the location of all heritage trees on a property when new building or outdoor space is planned. Development plans must preserve and minimize disturbance to as many trees as possible. Heritage trees can only be removed if approved by the county. The removal of any heritage trees must be mitigated by planting replacement trees at a ratio determined by the Santa Clara County Planning Department.

### 15.3 Regional Setting

ARC is in northern Santa Clara County at the southern end of the San Francisco Bay. U.S. Highway 101, adjacent to the southern boundary of the facility, provides primary transportation access to the facility. Ames is part of the metropolitan Bay Area; San Francisco is located 65 kilometers (40 miles) to the northwest and San Jose is located 16 kilometers (10 miles) to the southeast. The cities of Mountain View and Sunnyvale are adjacent to Ames, across U.S. Highway 101. The USFWS owns the salt ponds and marshes north of Moffett Field previously used for salt production by Cargill Salt Company. North of the USFWS Service property is the San Francisco Bay, approximately 1.6 kilometer (1 mile) to the north of Moffett Field. Stevens Creek forms the western boundary of ARC and discharges to San Francisco Bay. Along with three other area streams, Stevens Creek receives stormwater discharge from the City of Mountain View storm drain system, as well as treated groundwater from the MEW and NASA sites. There is also a limited connection between ARC and Guadalupe Slough via gates and pumps located to the northeast of Moffett Field, which discharge to the Northern Channel and Moffett Channel.



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## 15.4 Existing Site Conditions

The following sections discuss existing biological resources at ARC. Sections are organized geographically. The first three sections discuss resources in the (NRP and Ames Campus, the Bay View area, and the Eastside/Airfield area, respectively. A fourth section summarizes resources immediately north of the Bay View area, adjacent to but outside of the area, referred to herein as the North of Bay View area.

Vertebrate animal life at ARC largely consists of migratory and wintering birds, visiting birds from the nearby bay front and open water habitats, and several resident species of birds and small mammals. There are four federally-listed (Endangered or Threatened) species that either forage and/or breed at Ames. They are Ridgway's rail, California least tern, western snowy plover, and salt marsh harvest mouse.

Species listed as Federally Endangered or Threatened are fully protected under the provisions of ESA. Unlike threatened and endangered species, Federal Candidate Species and Federal Species of Special Concern are not afforded any legal protection under ESA but typically receive special attention from federal and state agencies during the environmental review process. Species listed on the state level include State Endangered, California Fully Protected, and California Species of Special Concern. All state and federal special-status species potentially found at ARC are summarized in Table 15-1 and are discussed in detail below.

Table 15-2 lists special-status plant species that occur or may occur in the Ames Research Center area. Based on research and analysis conducted during preparation of the NADP EIS, there are no designated critical habitat areas within or near the ARC. All of the existing habitat areas in the vicinity have been extensively disturbed by agriculture and development over the past two centuries.



Table 15-1. Special-Status Wildlife That Potentially Occur at NASA Ames Research Center

Common and Scientific Name	Status Fed/State	California Distribution	Habitats	Threats	Occurrence in Study Area
<b>Invertebrates</b>					
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	T/-	Vernal pools and seasonal wetlands of the Central Valley.	Vernal pools and other seasonal aquatic habitats.	Habitat loss as a result of dredging and filling; poor water quality.	No recorded observations in study area. Vernal pools are found as close as Alviso.
Bay checkerspot butterfly <i>Euphydryas editha bayensis</i>	T/-	Lowlands of Santa Clara, San Mateo, Alameda, Contra Costa, and San Francisco counties, on serpentine soils.	Serpentine soil outcrops that support host plants— <i>Plantago erecta</i> , <i>Castilleja densiflorus</i> , and <i>Castilleja exserta</i> .	Habitat loss as a result of urbanization and fragmentation.	No suitable habitat is present in the study area.
<b>Amphibians</b>					
California red-legged frog <i>Rana aurora draytonii</i>	T/SSC	Coast and coastal mountain ranges of California from Humboldt County south to San Diego County; Sierra Nevada (above 1,000 feet) from Butte to Fresno counties.	Permanent and semipermanent aquatic habitats (such as creeks and coldwater ponds) with emergent and submergent vegetation and riparian species along the edges; may estivate in rodent burrows or cracks during dry periods.	Alteration of stream and wetland habitats; historical overharvesting; habitat destruction; competition and predation by nonnative fish and bullfrogs.	No recorded observations in study area (Layne and Harding-Smith 1995; Scott and Alderete 2001). Unlikely to occur in study area because no suitable habitat exists: water sources are saline and/or seasonal, and water quality is low. Predators are abundant.
California tiger salamander <i>Ambystoma californiense</i>	E/SSC; FP	Central Valley, including Sierra Nevada foothills to elevations of approximately 1,000 feet; coastal region from Butte County south to Santa Barbara County.	Larvae use small ponds, lakes, or vernal pools in grasslands and oak woodlands; adults use rodent burrows, rock crevices, or fallen logs for cover and estivation.	Loss of grasslands, vernal pools, and other wetlands as a result of agricultural development and urbanization.	No recorded observations in study area (Layne and Harding-Smith 1995; Scott and Alderete 2001). Unlikely to occur in study area because no suitable habitat exists: water sources are saline and/or seasonal, and water quality is low. Predators are abundant.



Common and Scientific Name	Status Fed/State	California Distribution	Habitats	Threats	Occurrence in Study Area
Western spadefoot <i>Scaphiopus hammondi</i>	-/SSC	Sierra Nevada foothills, Central Valley, Coast Range, and coastal counties in southern California.	Shallow streams with riffles; seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands.	Alteration of stream habitats by urbanization and hydroelectric projects; loss of seasonal wetlands and vernal pools.	No recorded observations in study area. No suitable habitat is present, and study area is likely outside range of species.
<b>Reptiles</b>					
Alameda whipsnake <i>Masticophis lateralis euryxanthus</i>	T/T	Valleys, foothills, and low mountains in Alameda and Contra Costa counties.	Oak woodland, northern coastal scrub, and or chaparral; requires rock outcrops for cover and foraging.	Limited range and restricted habitat; habitat loss as a result of urban development; predation by domestic and feral cats.	No recorded observations in study area. Study area is likely outside range of species.
California horned lizard <i>Phrynosoma blainvillii</i>	-/SSC	Range extends from northern California to the tip of Baja California.	Sandy washes with open areas for sunning, bushes for cover, and loose soil for burrowing; near abundant food sources (ants and other insects).	Urban encroachment on habitat.	Not observed in study area; suitable habitat is sparse or absent.
Western pond turtle <i>Clemmys marmorata</i>	-/SSC	West of the Sierra-Cascade crest from sea level to elevations of approximately 6,000 feet.	Woodlands, grasslands, and open forests; occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and vegetation to provide cover and food.	Loss and alteration of aquatic and wetland habitats; habitat fragmentation.	Turtles have been observed in the Northern Channel, North Patrol Road Ditch and Marriage Road Ditch in Eastside/Airfield.
<b>Birds</b>					
Alameda song sparrow <i>Melospiza melodia pusillula</i>	-/SSC	Southern San Francisco Bay area.	Forages and takes cover in taller vegetation along tidal sloughs; breeds in salt marshes.	Habitat loss resulting from dredging, diking, and filling of marsh habitats.	May occur in the study area in wetlands in North of Bay View area (outside of planning areas). Difficult to distinguish from other subspecies that occur in the area.



Common and Scientific Name	Status Fed/State	California Distribution	Habitats	Threats	Occurrence in Study Area
Bald eagle <i>Haliaeetus leucocephalus</i>	-/E; FP	Year-round resident of mountain regions of northern California; winters throughout the state except for southern high-desert regions and parts of central inland California.	Uses ocean shorelines, lake margins, and river courses for nesting and foraging. Colonial nester; requires large or old-growth trees. Commonly nests in ponderosa pines.	Habitat loss as a result of urbanization.	May occur in study area.
Western burrowing owl <i>Athene cunicularia hypogea</i>	-/SSC	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along the south coast.	Uses rodent burrows in sparse grassland, desert, and agricultural habitats.	Habitat loss; human disturbance at nesting burrows.	Many nests have been recorded in upland habitats of the study area, within planning areas.
Short eared owl <i>Asio flammeus</i>	-/SSC	Open prairies and marshes.	Upland grassland and wetland areas.	Habitat loss and human disturbance.	Observed in Eastern Diked Marsh
Redhead <i>Aythya americana</i>	-/SSC	Found throughout California.	Freshwater lakes, ponds, and rivers. Winter in protected salt water bays and estuaries.	Habitat loss.	Found in SWRP, stormwater ditches, and catch basins.
California brown pelican <i>Pelecanus occidentalis</i>	-/FP	Along the coast from British Columbia to Central America. Breeding populations in Monterey County.	Coastal areas; on rocky shores and cliffs, in sloughs, and in coastal river deltas. Occasionally in inland lakes.	DDT contamination; overfishing of prey fish; human development around breeding and foraging habitat.	Nonbreeding foragers observed in wetlands in North of Bay View area (outside of planning areas); also roosts on pond levees.
Ridgway's rail <i>Rallus obsoletus</i>	E/E; FP	Salt and brackish marshes along San Francisco Bay.	Salt marshes with multiple tidal channels and vegetation dominated by cordgrass, pickleweed, and marsh gumplant.	Habitat loss and alteration as a result of filling, diking, and dredging.	Observed along Stevens Creek tidal slough (outside planning areas) and in North of Bay View.



<b>Common and Scientific Name</b>	<b>Status Fed/State</b>	<b>California Distribution</b>	<b>Habitats</b>	<b>Threats</b>	<b>Occurrence in Study Area</b>
California least tern <i>Sterna antillarum browni</i>	E/E; FP	Nests in San Francisco Bay and in coastal areas from San Luis Obispo County south to San Diego County. Largest concentrations of breeding pairs nest in Los Angeles, Orange, and San Diego counties. Sometimes seen around Salton Sea.	Sandy areas with sparse vegetation; mud flats; gravel substrates above high water.	Habitat loss as a result of human encroachment; predation; dredging, filling, and pollution of estuarine habitats.	Observed foraging and roosting in wetlands in North of Bay View area (outside of planning areas). May also nest on site.
Golden eagle <i>Aquila chrysaetos</i>	-/FP	Foothills and mountains throughout California; uncommon nonbreeding visitor to the lowlands, including the Central Valley.	Nests in cliffs and escarpments or in tall trees; forages in annual grasslands, chaparral, and oak woodlands with plentiful medium-sized and large mammals for prey.	Habitat loss as a result of urbanization.	Has been observed in the study area. Grasslands on site provides suitable foraging habitat.
Loggerhead shrike <i>Lanius ludovicianus</i>	-/SSC	Grasslands throughout the state.	Forages in grassland or ruderal habitats.	Loss of grassland habitat as a result of urban expansion.	Foraging behavior and nest sites have been documented in wetlands in North of Bay View area (outside of planning areas). May occur in similar habitats within planning areas.
Northern harrier <i>Circus cyaneus</i>	-/SSC; FP	Marshes, fields, grasslands, and prairies throughout North America.	Coastal salt and freshwater marshes. Nests on ground in shrubby vegetation, usually near marsh edge or in grasslands; forages in grasslands.	Habitat loss as a result of urbanization and agricultural development; pesticide contamination.	Observed in wetlands in North of Bay View area (outside of planning areas). Known to nest in wetland areas.



Common and Scientific Name	Status Fed/State	California Distribution	Habitats	Threats	Occurrence in Study Area
American peregrine falcon <i>Falco peregrinus anatum</i>	-/FP	In California, breeding range now includes the Klamath and Cascade ranges, the inland north-coastal mountains, the Sierra Nevada, and the Channel Islands.	Wetlands, grasslands, and tundra, in open forest, and in mountains. Prefers sites near open areas but with nearby cliffs for nesting and roosting; will occasionally nest on the ledges of tall buildings or bridges in cities.	Pesticide contamination; robbing of eyries by falconers; illegal shooting; human disturbance at nest sites.	Occurs in study area. Known to nest on Hangars, N-243, and 80x120 Wind Tunnel.
Salt marsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	-/SSC	Fresh and brackish marshes of the San Francisco Bay Area.	Freshwater and brackish marshes with emergent vegetation.	Habitat loss resulting from dredging, diking, and filling of marsh habitats.	Foraging and nesting sites have been documented in wetlands in North of Bay View area (outside of planning areas).
Tricolored blackbird <i>Agelaius tricolor</i>	-/SSC	From southern Oregon south through California's Central Valley and into Baja California.	Cattail and tule marshes; open valleys and foothills.	Habitat loss resulting from dredging, diking, and filling of marsh habitats.	May occur in wetlands in North of Bay View area (outside of planning areas).
Western least bittern <i>Ixobrychus exilis hesperis</i>	-/SSC	Breeds in parts of the Central Valley and inland northern California. Resident populations occur on the southernmost coast and from the Salton Trough and lower Colorado River regions south into Baja California and mainland Mexico.	Freshwater and brackish marshes with dense, tall aquatic or semi-aquatic vegetation. Colonial nester; nests in low tules, over water.	Habitat loss as a result of urbanization.	Observed foraging in wetland areas.
Western snowy plover <i>Charadrius alexandrinus mvosus</i>	T/SSC	Beaches and coastal settings from southern Washington to southern Baja California, and some inland playa lakes, primarily in California.	Sandy coastal beaches and margins of inland playas; prefers flat, bare, or sparsely vegetated substrates, particularly light-colored substrates.	Human disturbance; habitat loss.	Observed foraging in wetlands in North of Bay View area (outside of planning areas). Nesting confirmed in SWRB.



Common and Scientific Name	Status Fed/State	California Distribution	Habitats	Threats	Occurrence in Study Area
California black rail <i>Laterallis jamaicensis coturniculus</i>	T/FP	San Francisco Bay area, Sacramento-San Joaquin delta, coastal southern California (including Morro Bay), Salton Sea, and Lower Colorado River area.	Saline, brackish, and freshwater emergent wetlands.	Significant loss of salt and freshwater wetland habitat. Loss of higher-elevation wetlands around San Francisco Bay has eliminated breeding in the area.	Suitable habitat is present in North of Bay View area (outside of planning areas). Observed foraging in wetland areas.
American white pelican <i>Pelecanus erythrorhynchos</i>	-/SSC	Coastal bays and estuaries, inland lakes.	Open water habitats.	Habitat loss in inland areas; pesticide (DDT) poisoning; decline in water quality.	Occurs in open water habitats in North of Bay View area (outside of planning areas).
White-tailed kite <i>Elanus leucurus</i>	-/SSC; FP	Year-round resident in Oregon and California, except at high elevations.	Low rolling foothills and valley margins with scattered oaks for nesting and perching; river bottomlands and associated marsh habitats; open grasslands.	Habitat loss as a result of urbanization.	Nests locally; known to occur in wetlands in North of Bay View area (outside of planning areas).
<b>Mammals</b>					
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	E/E; FP	Saline wetlands of San Francisco Bay. Southern subspecies (R. r. raviventris) occupies San Mateo, Alameda, and Santa Clara counties.	Salt marsh habitat that supports large stands of pickleweed.	Habitat loss resulting from dredging and filling of pickleweed marshes around San Francisco Bay.	Occurs in pickle weed-dominated salt marshes in the North of Bay View area (outside of planning areas).
Salt marsh wandering shrew <i>Sorex vagrans halicoetes</i>	-/SSC	Southern San Francisco Bay area.	Salt marshes 6 to 8 feet above sea level, where abundant driftwood is scattered among pickleweed.	Habitat loss resulting from dredging, diking, and filling of marsh habitats.	No recorded observations in the study area. Suitable habitat exists in surrounding salt marshes (outside the planning areas).



Common and Scientific Name	Status Fed/State	California Distribution	Habitats	Threats	Occurrence in Study Area		
Western mastiff bat <i>Eumops perotis</i>	-/SSC	Eastern San Joaquin Valley from El Dorado County south through Kern County; Coast Ranges, Peninsular Range, and Transverse Ranges from San Francisco to the Mexican border.	Roosts and breeds in deep, narrow rock crevices; may also use crevices in trees, buildings, and tunnels. Forages in a variety of semiarid to arid habitats.	Unclear; possibly insecticide contamination and loss of foraging habitat; possibly disturbance of roosting sites.	No recorded observations in study area.		
Townsend's western big-eared bat <i>Plecotus townsendii</i>	-/SSC	Coastal regions from Del Norte County south to Santa Barbara County.	Roosts in caves, tunnels, mines, and dark attics of abandoned buildings.	Unclear; possibly human disturbance of roosting sites.	No recorded observations in study area. Buildings on site may provide roosting habitat.		
Pallid bat <i>Antrozous pallidus</i>	-/SSC	At low elevations throughout California.	Roosts in rocky outcrops, cliffs, and crevices; requires access to open habitats for foraging.	Human disturbance of roosting sites.	No recorded observations in study area. May forage over wetland and riparian areas in Bay View, North of Bay View, and Eastside/Airfield.		
Western red bat <i>Lasiurus blossevillii</i>	-/SSC	Breeding grounds found mainly in Central Valley.	Riparian habitat, particularly mature stands of Sycamore trees. Found in orchards in Valley.	Habitat loss.	Deceased specimen found between Hangar 2 and 3.		
<b>Fish</b>							
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	-/SSC	Coyote watershed and Sacramento River Drainage.	Estuarine environments.	Habitat loss and loss of spawning grounds.	Not known to occur in SWRB or the Northern Channel. Potential habitat exists.		
Longfin smelt <i>Spirinchus thaleichthys</i>	-/SSC	Coyote watershed and Sacramento River Drainage.	Estuarine environments.	Habitat loss and loss of spawning grounds.	Not known to occur in SWRB or the Northern Channel. Potential habitat exists.		
<p>Notes:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Federal Status:</p> <p>E = listed as endangered under the Federal Endangered Species Act</p> <p>T = listed as threatened under the Federal Endangered Species Act</p> <p>SC = species of concern</p> <p>- = no designation</p> </td> <td style="width: 50%; vertical-align: top;"> <p>State Status:</p> <p>E = listed as endangered under the California Endangered Species Act</p> <p>T = listed as threatened under the California Endangered Species Act</p> <p>SSC = species of special concern</p> <p>- = no designation</p> <p>FP = Department of Fish and Wildlife Fully Protected</p> </td> </tr> </table>						<p>Federal Status:</p> <p>E = listed as endangered under the Federal Endangered Species Act</p> <p>T = listed as threatened under the Federal Endangered Species Act</p> <p>SC = species of concern</p> <p>- = no designation</p>	<p>State Status:</p> <p>E = listed as endangered under the California Endangered Species Act</p> <p>T = listed as threatened under the California Endangered Species Act</p> <p>SSC = species of special concern</p> <p>- = no designation</p> <p>FP = Department of Fish and Wildlife Fully Protected</p>
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Source: NASA 2009, Alderete 2014a; CDFW 2014.							



Table 15-2. Special-Status Plants That Potentially Occur at NASA Ames Research Center

Common and Scientific Name	Status Fed./St/CNPS	California Distribution	Habitats	Flowering Period	Occurrence in Study Area
Hairless popcornflower <i>Plagiobothrys glaber</i>	-/-/1A	Presumed extinct (presumed extirpated in Alameda, Marin, Merced, San Benito, and Santa Clara).	Alkaline meadows, coastal marshes. Elevation: 15–180 meters (19–590 feet)	Mar.–May	No records of species in study area. Highly unlikely to occur; presumed extinct.
Point Reyes bird's-beak <i>Cordylanthus maritimus palustris</i>	-/-/1B	Humboldt, Marin, and Sonoma; presumed extirpated in Alameda, San Mateo, and Santa Clara.	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub. Elevation: 5–550 meters (16–1,805 feet)	Jun.–Oct.	Surveyed by Zippen and Engels 1997. None found. Suitable habitat is present in salt and brackish marshes in study area.
Robust spineflower <i>Chorizanthe robusta</i> var. <i>robusta</i>	-/-/1B	Marin, San Francisco, San Mateo, Santa Clara, and Sonoma; presumed extirpated in Alameda.	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub. Elevation: 5–550 meters (16–1,805 feet)	May–Sep.	No records of species in study area. Suitable habitat may be present. Highly unlikely to occur; thought to be extirpated from San Francisco Bay area.
San Francisco Bay spineflower <i>Chorizanthe cuspidata</i> var. <i>cuspidata</i>	-/-/1B	Marin, San Francisco, San Mateo, Santa Clara, and Sonoma; presumed extirpated in Alameda.	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub. Elevation: 5–550 meters (16–1,805 feet)	Apr.–Aug.	No records of species in study area. Suitable habitat is sparse or absent; species is unlikely to occur in study area.
San Joaquin spearscale <i>Atriplex joaquiniana</i>	-/-/1B	Alameda, Contra Costa, Glenn, Merced, Monterey, Napa, Sacramento, San Benito, Solano, and Yolo; presumed extirpated in San Joaquin, Santa Clara, and Tulare.	Chenopod scrub, meadows, playas, alkaline valley, and foothill grasslands. Elevation: 5–550 meters (16–1,805 feet)	Apr.–Oct.	No records of species in study area. Suitable habitat is sparse or absent; species is unlikely to occur in study area.
Congdon's tarplant <i>Hemizonia parryi</i> ssp. <i>congdonii</i>	-/-/1B.1	Alameda, Contra Costa, Monterey, Santa Clara, Santa Cruz, and San Luis Obispo Counties.	Upland grassland below 8,000 feet. Can tolerate alkaline or saline soils.	May– Oct.	Observed in several locations around the north end of the Moffett Field Golf Course.
California seablite <i>Suaeda californica</i>	E/-/1B.1	Alameda, Santa Clara, San Luis Obispo, and San Diego Counties.	Coastal Salt Marsh.	Jul.–Oct.	Surveyed by Zippen and Engels 1997. None found. Alderete 2013 in SWRB. None found.
Notes:					
Federal Status:			State Status:		
E = listed as endangered under the federal Endangered Species Act			E = listed as endangered under the California Endangered Species Act		
T = listed as threatened under the federal Endangered Species Act			T = listed as threatened under the California Endangered Species Act		
- = no designation			CNPS = California Native Plant Society		
Source: NASA 2009, Alderete 2014a; CDFW 2014.					

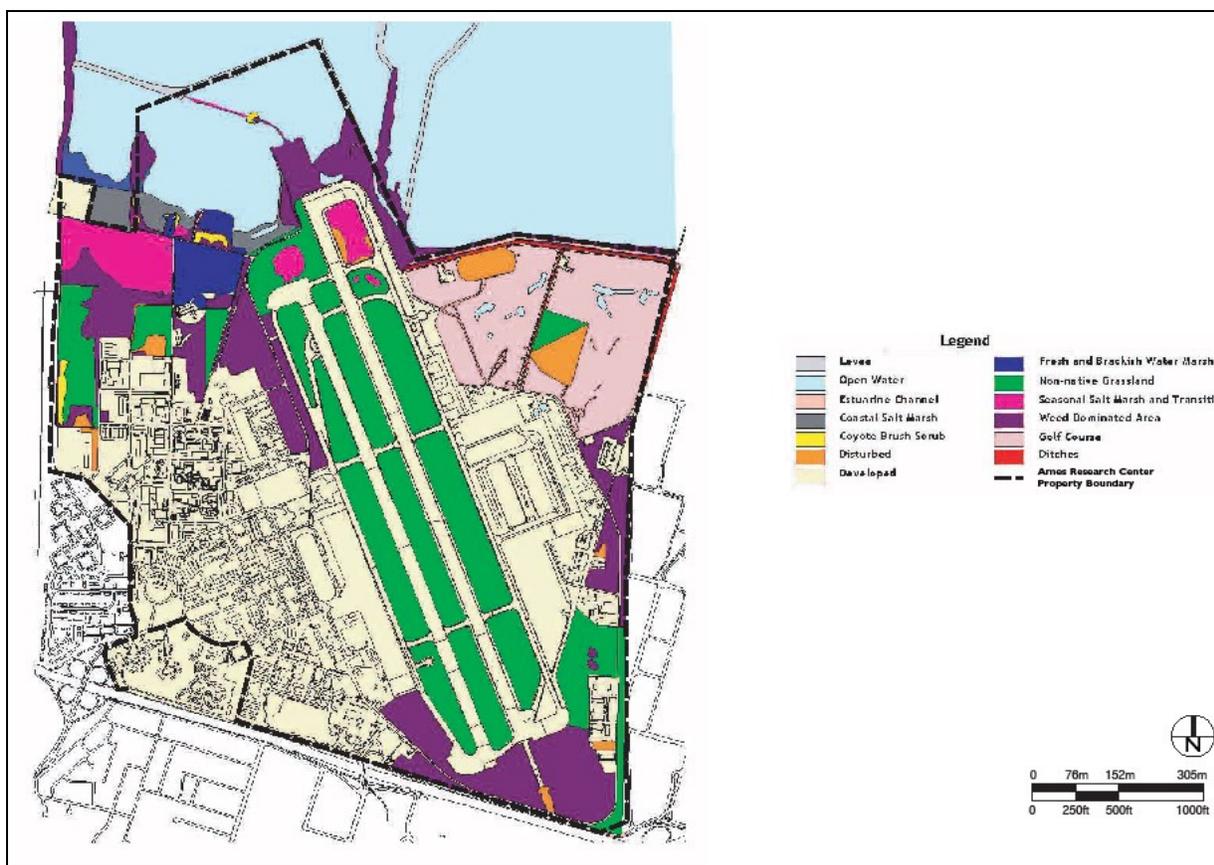


### 15.4.1 NASA Research Park and Ames Campus Areas

This section describes common and special-status plant and wildlife species found in the NRP and Ames Campus areas. The NRP and existing ARC areas are both highly urbanized areas of the ARC site. The bulk of development has occurred in these two areas and, as a result, what little habitat remains is disturbed and fragmented. Existing resources within the NRP and Ames Campus areas are very similar and, therefore, are addressed together.

#### 15.4.1.1 Vegetation

Habitat types in the NRP and Ames Campus areas include weed-dominated areas, disturbed areas, and urban landscaped areas. Figure 15-1 shows the distribution of these habitat types.



**Figure 15-1. Distribution of Vegetation Areas**

(Source: NASA 2009)

#### 15.4.1.1.1 Weed-Dominated Areas

Weed-dominated habitat occurs along roadsides and in undeveloped infill parcels in the NRP and existing Ames Campus areas. Extensive development has contributed to the establishment of weedy species; in many cases, weed-dominated areas are mowed or exhibit the effects of other past disturbance.



This habitat type is generally dominated by nonnative annual herbs, primarily bristly ox-tongue (*Picris echioides*), scattered geranium (*Geranium dissectum*), and nonnative annual grasses (*Avena* spp., *Polypogon monspeliensis*, *Hordeum* spp., and *Vulpia* spp.). These sites may also support invasive exotic weeds that crowd out native species and create a monoculture habitat with little value to wildlife. The dominant species in this habitat may alternate between nonnative grasses and weedy herbs, depending on the season, amount of rainfall, and maintenance activities (for example, mowing).

#### 15.4.1.1.2 Disturbed Areas

Disturbed areas are common in the undeveloped regions between buildings and along roadsides in NRP and Ames Campus areas. Disturbed areas may exhibit altered topography resulting from past or present fill or excavation and are commonly covered with debris. These areas are significantly altered from their original habitat type. In many cases, they are almost bare or are dominated by ruderal species. Weedy species that may be found in this habitat type include the invasive exotic perennial pepperweed (*Lepidium latifolium*).

#### 15.4.1.1.3 Urban Landscaped Areas

Urban landscaping includes ornamental trees, shrubs, and turf grasses that were intentionally planted around the buildings in the NRP area and the Ames Campus. Most species are nonnative and require irrigation and regular maintenance. Species planted in these areas include lawn grasses, juniper (*Juniperus* spp.), cypress (*Cypressus* spp.), and domestic roses (*Rosa* spp.). In 2007 and 2008, native gardens were established at the Center. Located west of N-269, and to the north of N-235, these gardens include a vast array of native plants.

#### 15.4.1.1.4 Special-Status Plants

No special-status plants are known or expected to occur in the NRP or Ames Campus planning areas because of their highly urbanized nature.

### 15.4.1.2 Wildlife

#### 15.4.1.2.1 Common Wildlife

Common species of wildlife found in these areas consist of species that are adaptable to human presence and disturbance, such as skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), and opossums (*Didelphis virginiana*). Also common are feral cats (*Felis catus*), which substantially disturb natural wildlife communities by predation. Small mammals, such as California ground squirrels (*Spermophilus beecheyi*), western harvest mice (*Reithrodontomys megalotis*), deer mice (*Peromyscus maniculatus*), California vole (*Microtus californicus*), and house mice (*Mus musculus*), are abundant and provide a significant prey base for these predators. Ornamental trees and shrubs create habitat for common bird species, such as European starling (*Sturnus vulgaris*), mourning dove (*Zenaida macroura*), Brewer's blackbird (*Euphagus cyanocephalus*), sparrow (*Zonotrichia* spp.), and house finch (*Carpodacus mexicanus*).



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#### 15.4.1.2.2 Special-Status Wildlife

##### 15.4.1.2.2.1 *Western Burrowing Owl*

Because of the highly urbanized nature of these areas, only one special-status animal, the western burrowing owl, is known or expected to occur in the NRP and Ames Campus areas.

Burrowing owls have been listed as a California Species of Concern since 1978, so direct impacts to either the birds or their nests are prohibited. In addition, the California Fish and Game Code prohibits the take, possession, or destruction of birds, their nests, or their eggs. Burrowing owls are also listed as a Federal Species of Concern.

Burrowing owls are small brown and white mottled owls with bright lemon-yellow eyes and long, unfeathered legs. They are approximately 18 to 25 centimeters (7 to 10 inches) tall, and weigh on average 3 to 4 ounces (150 grams). They range from Mexico to Canada. Of all of the 171 species of owls worldwide, the burrowing owl is the only one that nests underground.

Burrowing owls usually move into burrows that other animals have abandoned rather than digging their own, and thus usually live within colonies of small burrowing animals. In Northern California, burrowing owls live primarily in ground squirrel colonies. They not only use burrows that ground squirrels have abandoned as nests, but also depend on the squirrels to graze down the vegetation around burrows to short grass or even dirt, which is the owl's preferred habitat.

Typical burrowing owl habitat is open, dry, sparsely vegetated terrain. The availability of burrows is the most critical element. Owls' choice of burrows is affected by several key factors, such as the percentage of vegetative cover and the height of vegetation surrounding the burrow mouth, soil texture, and the presence of perches suitable for keeping watch for predators. At ARC, the typical vegetation height around burrows is 6.9 centimeters (2.7 inches) and the typical area of vegetative cover is 57%, as opposed to 26 centimeters (10.4 inches) and 85% in areas where no owls are found.

Historically, burrowing owls were found in natural areas of open prairie or open shrub-steppe habitat. Human population growth and land use changes have destroyed much of their original habitat, however, so burrowing owls now commonly nest in the perimeters of agricultural fields, irrigation ditches, fallow fields, open fields prepared for development, airports, golf courses, military bases, and parks. They have become quite tolerant of human presence as long as suitable nesting and foraging habitat exist.

Some burrowing owls are migratory, while others live in roughly the same area year round. Whether they migrate out or just move a small distance, burrowing owls often return to the same or nearby nest burrows each spring to breed. Once owls have chosen a nest burrow, they are loath to leave it, which can make it very difficult to relocate them. All of the relocation attempts that have been studied have had low success rates.

Burrowing owls are active during both day and night. By day, they stand by their nest burrow guarding against predators. At night they do most of their feeding. They prey primarily on large insects and small rodents. Burrowing owls forage in ruderal, manicured, or natural grasslands. While they do most of their foraging within 91 meters (300 feet) of



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their burrows, recent research also indicates that owls may forage as far as 4.8 kilometers (3 miles) from their burrows in the evening.

Burrowing owls are themselves prey for a number of aerial and ground species, including hawks, falcons, coyotes, snakes, skunks, raccoons, feral cats, and loose dogs. The major unnatural causes of death for owls include effects from pesticides, predation by nonnative and feral animals, destruction of nests by surface disturbances (such as grading), and collisions with cars since owls generally fly low to the ground.

Currently, the western burrowing owl is declining throughout much of its western North American range. It is endangered in Minnesota, Iowa, and throughout its range in Canada. It is a Species of Concern in six states, including California. The extensive destruction of prairie dogs and ground squirrels (whose colonies it usually shares), the use of pesticides and herbicides, and the conversion of grasslands to agricultural and urban uses have all contributed to the burrowing owl's declining numbers.

The burrowing owl was once a relatively common grassland bird in California. Although owls still occur in much of their pre-1940s range in California, the species no longer breeds in Marin, San Francisco, Santa Cruz, Napa, coastal San Luis Obispo, or Ventura counties. Only one to two breeding pairs exist in each of Sonoma, Santa Barbara, Orange, coastal Monterey, and San Mateo counties.

The South San Francisco Bay region, which includes Santa Clara and Alameda counties, lost a substantial portion of its owl population during the explosive development of the 1980s, and numbers are still declining. The region currently supports a population of approximately 120 breeding pairs of burrowing owls. ARC supports one of the largest subpopulations, with roughly 25 breeding pairs. The relatively large size of ARC's burrowing owl population makes it an anchor for the entire region. The survival of this population may thus be critical to the long-term persistence of burrowing owls in the region.

Burrowing owls have thrived at ARC for four main reasons. First, ARC's federal ownership has largely protected the land from the rampant development that has destroyed much of the owl habitat in the rest of Santa Clara County. A second reason is that ARC is closed to the public, preventing much human disturbance of owl burrows and foraging areas. Thirdly, short grass habitat has been maintained as part of standard maintenance procedures. Finally, ground squirrels are not controlled throughout much of ARC, which leaves burrowing owls their essential habitat requirements, ground squirrels and their burrows.

#### 15.4.2 Bay View Area

This section describes common and special-status wildlife species in the Bay View area. The Bay View area is less developed than other parts of ARC and, as a result, it supports more native habitat types. However, despite its more natural appearance, the Bay View area has been subject to disturbance, resulting in the development of nonnative grasslands and weed-dominated areas. For example, areas that now support coyote brush scrub and non-native grassland habitats were previously under dryland cultivation and were affected



by farming practices, including disking and plowing, until the 1980s. These areas were further disturbed during the recent clearing of Parcels 1, 2, and 4 for Google's Bay View campus, currently under development. The 42-acre property is under lease to PV, a wholly-owned subsidiary of Google, pursuant to a 2008 Enhanced Use Lease between PV and NASA. Development of the Bay View area was evaluated in the NADP EIS, for which a ROD was signed in November 2002.

### 15.4.2.1 Vegetation

Habitats in the Bay View area include seasonal salt marsh and transition, coyote brush scrub, nonnative grassland, weed-dominated areas, disturbed areas, and urban landscaped areas. Figure 15-1 shows the distribution of these habitat types.

#### 15.4.2.1.1 Seasonal Salt Marsh and Transition

Seasonal salt marsh is found in the wetlands north of the Bay View area and along the border between these wetlands and the Bay View area. Only a very small extent of seasonal salt marsh and transitional habitat is actually within the Bay View area (approximately 2.1 hectares [5.3 acres]).

Seasonal salt marsh occurs on the uppermost edges of coastal salt marsh habitats and includes vegetation that is transitional between the salt marsh and adjacent uplands or structural elements (roads, levees, and dikes). At lower elevations, seasonal salt marsh is dominated by pickleweed (*Salicornia virginica*), alkali heath (*Frankenia salina*), and salt grass (*Distichlis spicata*). Black mustard (*Brassica nigra*) and Australian saltbush (*Atriplex semibaccata*) are present along berms and in other elevated areas. In some areas, perennial pepperweed may exceed 50% cover. Its presence indicates the displacement of native plant species and reduction in habitat value for wildlife.

#### 15.4.2.1.2 Coyote Brush Scrub

At the ARC, areas of coyote brush scrub include regions that have been disturbed in the past or have been subjected to repeated disturbances over time. In the Bay View area, this habitat type occurs on the western boundary of the ARC, along West Perimeter Road.

In coastal areas, coyote brush (*Baccharis pilularis*) is often one of the first native shrub species to colonize disturbed upland areas and sometimes forms dense stands. Dense stands of coyote brush are categorized as coyote brush scrub. The overstory of coyote brush scrub is dominated by coyote brush. The species composition of the herbaceous plants in the understory is similar to that of adjacent habitats (nonnative grassland or weed-dominated areas). At the ARC, other shrub and tree species were also observed in some stands of coyote brush scrub, including the native elderberry (*Sambucus mexicana*) and nonnative ornamental olive (*Olea* spp.) and acacia (*Acacia* spp.).

#### 15.4.2.1.3 Nonnative Grassland

A large portion of the Bay View area along the west boundary of the ARC (West Perimeter Road) is nonnative grassland habitat. Areas classified as non-native grasslands are dominated by nonnative grasses, including annual Mediterranean grasses such as



Mediterranean rye (*Lolium multiflorum*), wild oats (*Avena* spp.), bromes (*Bromus* spp.), and rattail fescue (*Vulpia myuros*). Another common species, creeping red fescue (*Festuca rubra*), is a nonnative perennial grass. Non-native herbaceous species contribute less than 20% of vegetation cover in nonnative grasslands; they include bristly ox-tongue, birdfoot trefoil (*Lotus corniculatus*), field bindweed (*Convolvulus arvensis*), and milk thistle (*Silybum marianum*).

#### 15.4.2.1.4 Weed-Dominated Areas

The Bay View area supports weedy habitats similar to those in the NRP and existing ARC Campus areas. Weed-dominated habitat in the Bay View area occurs along roadsides and in open spaces between development sites. It may also occur as patches enclosed by other habitat types. Some weed-dominated habitats in the Bay View area include areas where moist soil supports an increased diversity of nonnative weedy species. In some locations, large stands of invasive exotic species such as kikuyu grass (*Pennisetum clandestinum*), periwinkle (*Vinca major*), and perennial pepperweed are present. Kikuyu grass is abundant on berms, roadsides adjacent to coastal salt marsh, and freshwater and brackish marsh habitats. Figure 15-1 shows the location of a large stand of periwinkle. The presence of these species is notable because they are all highly invasive and have the potential to displace vegetation that is more desirable. If not controlled, these invasive species will continue to spread into surrounding habitats.

#### 15.4.2.1.5 Other Habitat Types

Other habitat types are sparsely represented in the Bay View area. Because there has been little development in the area, currently disturbed areas are limited to Bay View Parcels 1, 2, 4 (discussed above) and the perimeters of existing buildings in this area.

#### 15.4.2.1.6 Special-Status Plants

No special-status plants are known or expected to occur in the Bay View area because of its highly urbanized nature.

### 15.4.2.2 Wildlife

#### 15.4.2.2.1 Common Wildlife

The Bay View area supports a variety of wildlife. Common and dominant species include many birds that use coyote brush scrub, nonnative grassland, and the willows in the wetter areas. These species include song sparrow (*Melospiza melodia*), white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Zonotrichia atricapilla*), lesser goldfinch (*Carduelis psaltria*), American goldfinch (*Carduelis tristis*), Brewer's blackbird, western meadowlark (*Sturnella neglecta*), marsh wren (*Cistothorus palustris*), Bewick's wren (*Thryomanes bewickii*), and house finch. Raccoons, opossums, and skunks are common mammals in this area. Non-native red foxes (*Vulpes vulpes*) and feral cats are also frequently seen. Small mammals supply an abundant prey base; they include burrowing species, such as pocket gophers (*Thomomys bottae*), and larger lagomorphs, such as black-tailed hares (*Lepus californicus*).



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Because of the Bay View area's proximity to wetland and open water habitats, and the intermittent presence of a small extent of open water within the Bay View area, migratory waterfowl are common.

#### 15.4.2.2.2 Special-Status Wildlife

The following special-status animal species have been observed in the Bay View area.

##### 15.4.2.2.2.1 *Salt Marsh Common Yellowthroat*

The salt marsh common yellowthroat (*Geothlypis trichas sinuosa*) is a California Species of Special Concern. It is a small warbler that resides in the marshes of the San Francisco Bay area. During the breeding season (March to late July), it can be found in marshes from Sonoma, Napa, Solano, and Marin counties south to Santa Clara County. This species uses both wetland and upland vegetation for foraging and nesting. Salt marsh common yellowthroats are common during the breeding season at ARC.

##### 15.4.2.2.2.2 *Loggerhead Shrike*

The loggerhead shrike (*Lanius ludovicianus*) is a state and federal Species of Special Concern. It is a common resident and winter visitor in lowlands and foothills throughout California, and prefers open habitats offering scattered shrubs, trees, posts, fences, utility lines, or other perches. Loggerhead shrikes are commonly observed in the Bay View area in the upland habitats adjacent to the freshwater and brackish marshes.

##### 15.4.2.2.2.3 *White-Tailed Kite*

White-tailed kites (*Elanus leucurus*) are fully protected under Section 3511 of the California Fish and Game Code. This species is a year-round resident of low rolling foothills and valley margins throughout California, and often forages for birds and small mammals in open grassland and marsh habitats. White-tailed kites are common at ARC. Individuals of the species have been observed in courtship behavior and nests have been found in the Storm Water Retention Pond and the Western Diked Marsh.

##### 15.4.2.2.2.4 *Western Burrowing Owl*

Burrowing owls are uncommon in the Bay View area, but can be found in Shoreline Regional Park to the west of ARC.

##### 15.4.2.2.2.5 *Northern Harrier*

Northern harriers (*Circus cyaneus*) are fully protected under Section 3511 of the California Fish and Game Code. They are large raptors that occupy coastal salt and freshwater marshes. Northern harriers often forage in grasslands and fields that surround the marsh north of the Bay View area, and they are seen regularly in the Bay View area.

##### 15.4.2.2.2.6 *Golden Eagle*

The golden eagle is a California Species of Special Concern and is protected under the federal Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The golden eagle feeds mainly on rabbits and on California ground squirrels. Pairs typically nest on cliffs or in trees, preferably near grasslands where prey is available. Golden eagles have



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been observed in the Bay View area, and foraging habitat is available in the area's nonnative grasslands and weed-dominated habitats.

#### 15.4.2.2.3 American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus anatum*) is state-listed as endangered. Peregrine falcons nest on ledges in tall vertical cliffs and other rocky outcrops secure from predators. The species forages on a variety of birds and small mammals in both terrestrial and wetland habitats. Suitable foraging habitat exists throughout the annual grasslands and weed-dominated portions of ARC. Peregrine falcons have nested at various locations at Ames for a number of years.

### 15.4.3 Eastside/Airfield

This section describes common and special-status wildlife species found in the Eastside/Airfield area. The airfield and its accompanying hangars and support buildings occupy the majority of the Eastside/Airfield area. Other land uses in the area include office buildings and the golf course. The golf course provides irrigated, grassy, open habitat for small mammals and the predators that prey on them. Both California ground squirrels and burrowing owls are numerous. The golf course also encompasses permanent ponds and stormwater runoff ditches that are supplied with brackish water, providing habitat for a large population of western pond turtles.

#### 15.4.3.1 Vegetation

Habitats in the Eastside/Airfield area include estuarine channel, seasonal wetland, seasonal salt marsh, nonnative grassland, weed-dominated areas, disturbed areas, and a golf course.

##### 15.4.3.1.1 Estuarine Channel

The northern channel is a storm drain channel that contains shallow water habitats that exhibit estuarine characteristics. USFWS ponds to the north may influence adjacent tidal wetlands. The channel runs along the northern boundary of the Eastside/Airfield area and is separated from the North Patrol Road by an armored chain link fence and the East Patrol Road Ditch. The northern channel's saltwater influx is contributed by the San Francisco Bay, and becomes seasonally diluted by freshwater runoff that enters the channel. The channel's shore supports emergent hydrophytic vegetation that provides habitat for a variety of waterbirds, including salt marsh common yellowthroat (*Geothlypis trichas sinuosa*) and common moorhen (*Gallinula chloropus*). The channel also supports several fish and invertebrate species, including bay shrimp, crab and mosquito fish and longjaw mudsucker (*Gallinula chloropus*). Freshwater gastropod shells have been found in the channel, suggesting that the winter influx of fresh water supports populations of snails.

##### 15.4.3.1.2 Seasonal Wetland

The seasonal wetlands in the Eastside/Airfield area are located on the airfield itself and in several ditches on and adjacent to the golf course. Because of their low elevation and proximity to salt water, these wetlands may be slightly brackish or alkaline. Vegetation in



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this habitat type is a mosaic of large patches of Baltic rush (*Juncus balticus*), creeping wild rye (*Leymus triticoides*), and cattails (*Typha* spp.). Other species include spearscale (*Atriplex triangularis*), salt grass, clustered field sedge (*Carex praegracilis*), and nonnative perennial pepperweed.

#### 15.4.3.1.3 Seasonal Salt Marsh

In the Eastside/Airfield area, seasonal salt marsh habitats occur in constructed ditches. The ditches are located along East Patrol Road and North Patrol Road adjacent to the golf course. They represent a unique habitat because their steep banks and the long-term availability of water support the development of several narrow, linear vegetation zones adjacent to one another.

The ditch along North Patrol Road has steep banks, and wetland vegetation is limited to the lower portions of the banks, immediately above the water line. The dominant plant species in the wetland portions of the North Patrol Road ditch include pickleweed, salt grass, and prairie bulrush (*Scirpus maritimus*). Adjacent uplands support the nonnative herbaceous species birdfoot trefoil and yellow sweet clover (*Melilotus indicus*) and the nonnative grasses rattail fescue and Mediterranean canary grass (*Phalaris minor*). Cattails and bulrushes (*Scirpus* spp.) form patches of emergent vegetation.

The ditch along the East Patrol Road is slightly wider and has more gently sloping banks than the North Patrol Road ditch. During the field surveys in August and September 2000, surface water was present only in a ponded area at the northern end of the ditch. The East Patrol Road ditch supports much less vegetation than the North Patrol Road ditch, and it is dominated by nonnative dallis grass (*Paspalum dilatatum*) and litter, with a few stands of prairie bulrush.

#### 15.4.3.1.4 Other Habitat Types

Nonnative grasslands, weed-dominated areas, and disturbed areas are also present in the Eastside/Airfield area. They occur between developed parcels, along roads, and in open fields.

#### 15.4.3.1.5 Golf Course

The golf course provides irrigated, grassy, open habitat for small mammals and the predators that prey on them. Both California ground squirrels and western burrowing owls are numerous. The golf course also encompasses permanent ponds and stormwater runoff ditches that are supplied with brackish water.

#### 15.4.3.1.6 Special-Status Plants

In Fall of 2013, Congdon's tarplant (*Hemizonia parryi* ssp. *congdonii*) was observed in several locations on the north side of the golf course and later confirmed by a local biologist. Two distinct patches were found: a western patch that disappeared during the 2014 growing season and a much larger eastern patch that continues to persist. NASA's wildlife biologist has put temporary fencing around the patches to protect them during the seeding phase but allows the patches to be mowed short along roadsides after flowering.



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The biologist is currently working with NASA Grounds Maintenance to protect this species where it is found (Alderete 2014b).

### 15.4.3.2 *Wildlife*

#### 15.4.3.2.1 *Common Wildlife*

Common and dominant wildlife species that occur in the Eastside/Airfield area are similar to those found in the NRP and Ames Campus areas. In addition, the migratory waterfowl present in the most of the Bay View area utilize the seasonal wetlands in the northern portion of the airfield when enough rain falls to fill them. The prey base of small mammals (particularly California ground squirrels) in the Eastside/Airfield is large, and many raptors have been seen hunting here, including the peregrine falcon, golden eagle, and white-tailed kite.

#### 15.4.3.2.2 *Special-Status Wildlife*

The following special-status animal species occur or may occur in the Eastside/Airfield area.

##### 15.4.3.2.2.1 *Western Burrowing Owl*

Because of the large population of California ground squirrels, burrowing owls are common in the Eastside/Airfield area and on the Lockheed Martin property to the east of ARC.

##### 15.4.3.2.2.2 *Western Pond Turtle*

The western pond turtle (*Clemmys marmorata*) is a California Species of Special Concern. Pond turtles are found in quiet waters of lowland and foothill ponds, streams, marshes, and reservoirs. They require upland habitat for breeding. A pond turtle may travel long distances upslope from a permanent or nearly permanent water source to lay its eggs in grassland or scrub habitat. Turtles have been observed in the Northern Channel and Marriage Road Ditch in Eastside/Airfield. ARC has developed a habitat management plan to protect the western pond turtle population (Jones & Stokes 2004).

##### 15.4.3.2.2.3 *California Red-Legged Frog*

The California red-legged frog is federally listed as Threatened and is a California Species of Special Concern. The species requires permanent or semi-permanent aquatic habitats with emergent and submergent vegetation. Red-legged frog surveys were conducted in 1994 (Layne and Harding-Smith 1995) and 2001 (Scott and Alderete 2001), but no frogs or larvae have been detected.

Suitable habitat for the California red-legged frog may occur in ponds and ditches on the golf course. However, salinity levels in these ponds are normally within the lethal range for developing red-legged frog embryos and larvae. Because of the lack of suitable habitat and the presence of predators, California red-legged frogs are considered very unlikely to occur in the Eastside/Airfield area.



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#### 15.4.3.2.2.4 *California Tiger Salamander*

The California tiger salamander is a candidate for federal listing and is a California Species of Special Concern. Tiger salamanders are terrestrial and spend most of their time underground in small-mammal burrows, emerging only for brief periods to breed. Breeding is known to occur in temporary pools and may occur in more permanent bodies of water.

The salinity tolerance of the California tiger salamander is unknown, but may be similar to that of the California red-legged frog. California tiger salamander surveys have been conducted, but no individuals have been observed. Because of the lack of suitable habitat and the presence of predators, California tiger salamanders are considered very unlikely to occur in the Eastside/Airfield area.

#### 15.4.4 **North of Bay View Area**

Immediately north of the Bay View area is a tract of high-quality wetland habitat that is rich in vegetation and wildlife. This region, referred to as the North of Bay View area, is within ARC jurisdiction, but has been excluded from future development because of the special-status species it supports or may support, and because of the presence of jurisdictional wetlands.

The North of Bay View wetland area contains the most diverse and least disturbed habitats at ARC, including coastal salt marsh, seasonal salt marsh and transition, freshwater and brackish marshes, coyote brush scrub, unvegetated areas (including open water), and disturbed areas. Habitat suitable for many special-status plants and wildlife occur or may occur in the North of Bay View area. Surveys have been conducted for delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), hairless popcornflower (*Plagiobothrys glaber*), Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*), and California sea-blite (*Suaeda californica*). To date, none of these species has been observed.

In addition, habitat suitable for many special-status wildlife species occurs or may occur in the North of Bay View area. Surveys have documented the presence of many special-status wildlife species, including: salt marsh harvest mouse, California brown pelican, Ridgway's rail (*Rallus obsoletus*), California least tern, western burrowing owl, golden eagle, loggerhead shrike, northern harrier, peregrine falcon, salt marsh common yellowthroat, western snowy plover, and white-tailed kite. Special-status species that have not been recorded, but for which suitable habitat is present, include Alameda song sparrow (*Melospiza melodia pusillula*), tricolored blackbird (*Agelaius tricolor*), western least bittern (*Ixobrychus exilis hesperis*), salt marsh wandering shrew (*Sorex vagrans haliocoetes*), and bald eagle.

### 15.5 **Environmental Requirements**

NASA has identified the following plans, programs, policies, and measures that are designed to protect special-status wildlife species and their habitats at ARC.



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### 15.5.1 NASA Procedural Directive 8500.1, NASA Environmental Management

Per NPD 8500.1, it is NASA policy to: maintain compliance with all applicable federal, state, and local environmental requirements; to incorporate environmental risk reduction and sustainable practices to the extent practicable throughout NASA's programs, projects, and activities; and to consider environmental factors throughout the life cycle of programs, projects, and activities (as defined in NPD 7120.4, *NASA Engineering and Program/Project Management Policy*, and related documents), including planning, development, execution, and disposition activities. Examples of environmental factors include consideration of environmental impacts as required by the NEPA and NHPA; the proposed use of hazardous materials; the potential for waste generation; the need to acquire necessary permits, waivers, and authorizations; and the use of environmentally-preferable materials and processes wherever practicable.

### 15.5.2 Ames Procedural Requirements 8500.1, Ames Environmental Procedural Requirements

APR 8500.1 sets forth general procedural requirements to ensure compliance with applicable federal, state, and local environmental laws; regulations and EOs; and NASA policies and procedures. Organizational directors, division chiefs, branch chiefs, section heads, supervisors, managers, and CORs are responsible for planning, designing, constructing, managing, operating, and maintaining facilities in conformance with applicable regulatory directives, and should obtain environmental review from the Environmental Management Division early in project planning consistent with NASA's NEPA implementing procedures (NPR 8580.1 and EO 12114), NASA policies and procedures for programs and projects (NPR 7120), and NASA regulations related to environmental quality (14 CFR 1216). Program and project managers should coordinate with the Environmental Management Division in a timely manner to ensure that any new or modified programs, projects, and activities comply with regulatory requirements.

### 15.5.3 Ames Environmental Work Instructions

Ames's EWIs, which replace the previous Ames Environmental Handbook (APR 8800.3), set forth requirements to ensure that programs, projects, and activities at ARC comply with applicable federal, state, and local laws; regulations and EOs; and NASA policies and procedures. Each EWI lists relevant regulatory authorities and documents, assigns individual and organizational responsibilities within ARC, and identifies specific requirements applicable to the work being performed.

The following EWIs are relevant to operations and future development at ARC with the potential to impact biological resources.

- EWI 2-4, Wetlands and Flood Plains (Under review)
- EWI 12, Public Involvement
- EWI 14, NEPA and Environmental Justice
- EWI 15, Wildlife (Under review)



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- EWI 18, Environmental Requirements for Construction Projects (Under review)

#### 15.5.4 **Burrowing Owl Habitat Management Plan**

To protect the burrowing owl population at ARC, a BOHMP) was prepared in 1999 by Dr. Lynne Trulio, a burrowing owl expert, and incorporated into the 2002 NADP EIS. This report presents management techniques for protecting owls and owl habitat, relocating predators, and minimizing the impact of any new projects ARC's owl population.

The BOHMP describes potential impacts from the proposed NADP development Alternatives analyzed in the NADP EIS, and lays out measures to avoid or mitigate them. The key provision of the BOHMP is the creation of burrowing owl preserves. The alternatives vary somewhat in the size of the preserves they set aside for burrowing owls. In the BOHMP, Dr. Trulio and NASA staff selected a 9-hectare (22-acre) area in NRP, a 3-hectare (8-acre) site in the Ames Campus area, a 10-hectare (24-acre) area in Eastside/Airfield, and an 11-hectare (27-acre) area in Bay View. Together, the four preserves set aside approximately 33 hectares (81 acres) for burrowing owl nesting and foraging. According to the BOHMP, NASA would avoid most of the potentially significant long-term impacts on burrowing owl nesting habitat by establishing these preserves and steering development away from them.

Because impacts on burrowing owls could still result from implementation of the NADP, the BOHMP includes mitigation measures to address these impacts, which are described in more detail in Section 4.9 of this EIS. The mitigation measures are designed to address loss of burrows during construction, loss of habitat due to new development, disturbance of existing burrows, increased vehicle collisions, control of ground squirrels, decreased prey base, and increased predation. Taken together, the avoidance mitigation measures described in Section 4.9 are expected to achieve long-term protection of the existing burrowing owl colony at the Center given the proposed level of development under the NADP.

The BOHMP is included in Appendix F of the NADP EIS.

#### 15.5.5 **Other Plans**

Other plans that are applicable to the management of common and special-status wildlife at ARC include, but are not limited to, the following:

- Western Pond Turtle Habitat Management Plan
- Wildlife Management Plan for Ammunition Bunkers
- Wildlife Management Plan for Chase Park
- Electrical Substation Wildlife Management Plan
- Ground Squirrel Action Plans
- Ground Squirrel Control Plans
- Airfield Wildlife Control Safety Plan



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- Wildlife Hazard Management Plan (JO-7)

### 15.5.6 Predator Management Program

In the mid-1990's USFWS adopted a Predator Management Program to help recover the Federally Endangered Ridgeway's rail from small mammalian predators. Non-native red fox was recently introduced to the Bay Area, and was having a large impact on the ground nesting birds. NASA Ames Research Center has a large area of Coastal Salt Marsh habitat on the northern end of the runways, and is adjacent to high quality rail breeding grounds in the Steven's Creek drainage. NASA adopted the trapping program to be in line with federal guidelines to protect the endangered species found on property including salt marsh harvest mouse, snowy plover, and least tern. In 2003, a study was conducted in the SWRP to determine what predator species were found hunting in Coastal Salt Marsh and what kind of impact they were having (Meckstroth and Miles 2003). It was found that most of the nests during the breeding season in the SWRP were predated and that skunks were the most abundant predator. USDA Wildlife Services routinely surveys and traps small mammalian predators at Ames to reduce the predation pressure on these species.

### 15.5.7 NASA Ames Development Plan Final Programmatic Environmental Impact Statement

The NADP EIS identifies the following mitigation measures to address impacts to special-status wildlife from build out of NADP Mitigated Alternative 5.

#### 15.5.7.1 *Mitigation Measure BIO-1*

*To minimize the potential for injury or death caused by construction vehicles to western burrowing owls or migratory birds in all four planning areas, and to salt marsh harvest mice in the Bay View area, the following components would be implemented:*

- *As much as possible, construction traffic would not be routed on roads adjacent to habitats where these special-status species occur and would be prohibited from using roads when habitat considerations require it.*
- *Occupied or potential habitat for these species near established routes would be marked as off-limits to construction vehicles.*
- *In the Bay View area, if construction vehicles must travel on roads within approximately 30 meters (100 feet) of occupied or potential habitat, drift fencing would be erected to prevent salt marsh harvest mice from crossing these roads. The drift fencing would be placed so that harvest mice retain access to adjacent upland habitats for use as refuge during high water events.*
- *All drivers of construction vehicles would be informed of the established vehicle routes and made aware of the importance of*



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*avoiding occupied and potential habitat for western burrowing owls and salt marsh harvest mice.*

- *Construction activities would not be allowed to disturb nesting migratory birds.*

### **15.5.7.2 Mitigation Measure BIO-3**

*Landscaping would be designed with native species (with the possible exception of lawn areas). Invasive plants would not be used in any landscaping. Any imported soil used for landscaping must be certified as weed-free. Similarly, any erosion-control structures that contain hay or other dried plant material (for example, hay bales) must be certified as weed-free. Any construction equipment operating within 76 meters (250 feet) of jurisdictional wetlands or other sensitive habitats in the Bay View area would be washed with reclaimed water prior to use in this area to remove potential weed seeds. The construction zone would be surveyed periodically by a qualified botanist so that any infestations of invasive species that establish within the construction zone of the Bay View area can be eradicated before the plants can flower and set seed.*

### **15.5.7.3 Mitigation Measure BIO-4a**

*NASA and its partners would institute the following programs and policies to limit increases in predator populations:*

- *Prohibit employees from feeding wildlife, including cats*
- *Institute and enforce a no pets policy in new housing or offices*
- *Install trash containers that cannot be opened by predator species*
- *Augment the existing nonnative predator control program, which includes humane trapping and removal of feral cats and other nonnative predators*
- *Conduct a public education program about the impacts caused by nonnative predators and the need to refrain from feeding feral cats and other wildlife*
- *A regular construction cleanup crew would be designated to ensure that construction debris and trash do not attract predators or scavengers*



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#### 15.5.7.4 *Mitigation Measure BIO-4b*

*Design north and east fences bordering Bay View housing to eliminate movement of potential predators from the housing area to sensitive wildlife areas. The design would include:*

- *Burying the bottom portion of the fence at least 46 centimeters (18 inches) below ground level*
- *Making the fencing grid size small enough to prevent rats from passing through*
- *Placing roll wire along the top of the fencing to eliminate predators climbing over the fence and to deter avian predators from perching*

#### 15.5.7.5 *Mitigation Measure BIO-5*

*To avoid impacts to roosting bats, a qualified wildlife biologist would conduct a preconstruction survey of buildings to be demolished or renovated in accordance with recommendations of the California Department of Fish and Game. If special-status roosting bats are found, the California Department of Fish and Game is to be consulted. An avoidance or mitigation plan would be developed and implemented. Avoidance measures could include construction outside of hibernation and maternal roosting periods (winter), excluding bats from the buildings after they have left the roost to forage at night by closing entrances, and the construction of bat boxes to accommodate displaced bats. If bat boxes were used, NASA would monitor their success.*

#### 15.5.7.6 *Mitigation Measure BIO-6*

*NASA and its partners would use trash receptors that are animal resistant, and would maintain a regular garbage disposal schedule.*

#### 15.5.7.7 *Mitigation Measure BIO-7*

*NASA is conducting a lighting study to determine baseline levels. When feasible, nighttime lighting would be excluded in new development adjacent to high-quality wildlife habitat in the North of Bay View area. The Bay View housing would not be allowed to cause a net increase in lighting in the areas north or east of Bay View. The impacts of necessary lighting would be minimized by using low-glare light sources for example, low-pressure sodium lighting) mounted on short poles and directed away from native habitats. In addition, light amplification to nearby sensitive areas would be eliminated through directional lighting with baffles, non-reflective tinting on windows, and other mechanisms.*



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### **15.5.7.8 Mitigation Measure AES-6a**

*Where possible, NASA and its partners would carefully site any development so as to preserve the protected trees.*

### **15.5.7.9 Mitigation Measure AES-6b**

*Where it is not possible to preserve protected trees in place, NASA and its partners would develop a revegetation plan consistent with the requirements of the Santa Clara County Tree Preservation and Removal Ordinance.*